

**BEFORE THE  
PUBLIC SERVICE COMMISSION OF  
SOUTH CAROLINA  
DOCKET NO. 2021-3-E**

In the Matter of	)	
Annual Review of Base Rates	)	<b>DIRECT TESTIMONY OF</b>
for Fuel Costs for	)	<b>BRYAN P. WALSH FOR</b>
Duke Energy Carolinas, LLC, Increasing	)	<b>DUKE ENERGY CAROLINAS, LLC</b>
Residential and Non-Residential Rates	)	

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1   **Q.     PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

2   A.     My name is Bryan P. Walsh, and my business address is 526 South Church Street, Charlotte,  
3         North Carolina 28202.

4   **Q.     BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?**

5   A.     I am Vice President of Central Services and Organizational Effectiveness for Duke Energy  
6         Business Services, LLC (“DEBS”). DEBS is a service company subsidiary of Duke Energy  
7         Corporation (“Duke Energy”) that provides services to Duke Energy and its subsidiaries,  
8         including Duke Energy Carolinas, LLC (“DEC” or the “Company”) and Duke Energy  
9         Progress, LLC (“DEP”).

10  **Q.     PLEASE DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL**  
11  **BACKGROUND.**

12  A.     I graduated from The Catholic University of America in 1997 with a Bachelor of Mechanical  
13         Engineering degree. I also graduated from the Georgia Institute of Technology in 1999 with  
14         a Master of Science in Mechanical Engineering, with a concentration in thermodynamics and  
15         heat transfer. I have been licensed as a registered Professional Engineer in the State of North  
16         Carolina since 2002. My career began with Duke Energy as part of Duke / Fluor Daniel in  
17         1999 as an associate engineer assisting in the design, commissioning, and testing of new  
18         combined-cycle power plants. I transferred to Duke Power in 2003 and worked in the  
19         Technical Services group for Fossil-Hydro. Since that time, I have held various roles of  
20         increasing responsibility in the generation engineering, operations areas, and project  
21         management, including the role of technical manager at DEC’s Marshall Steam Station, and  
       also station manager at Duke Energy Indiana’s Gallagher

1 the Midwest Gas Turbine Fleet and various coal-fired facilities in Indiana and Kentucky.  
2 During my time in the Midwest, I also served as Chairman of the Indiana Energy Association's  
3 Power Production Committee, which brought together Duke Energy and peer utilities  
4 Vectren, NIPSCO, AEP and IP&L for operational experience exchanges, along with  
5 coordination on common industry issues. I was named General Manager for Outages &  
6 Projects in the Carolinas in 2015. Next, I became the General Manager of Fossil-Hydro  
7 Organizational Effectiveness in 2017. I assumed my current role in 2019.

8 **Q. WHAT ARE YOUR DUTIES AS VICE PRESIDENT OF CENTRAL SERVICES**  
9 **AND ORGANIZATIONAL EFFECTIVENESS?**

10 A. In this role, I am responsible for providing engineering, environmental compliance planning,  
11 generation and regulatory strategy, technical services, and maintenance services for Duke  
12 Energy's fleet of fossil, hydroelectric, and solar (collectively, "Fossil/Hydro/Solar") facilities.

13 **Q. HAVE YOU TESTIFIED BEFORE THIS COMMISSION IN ANY PRIOR**  
14 **PROCEEDINGS?**

15 A. Yes. I testified before the Public Service Commission of South Carolina in DEP's 2018 and  
16 2021 fuel costs proceedings in Docket No. 2018-1-E and Docket No. 2021-1-E.

17 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?**

18 A. The purpose of my testimony is to (1) describe DEC's fossil/hydro/solar generation portfolio  
19 and changes made since the 2020 fuel cost recovery proceeding, as well as those expected in  
20 the near term, (2) discuss the performance of DEC's fossil/hydro/solar facilities during the  
review period of June 1, 2020 through May 31, 2021 (the "review period"),

**Q. PLEASE DESCRIBE DEC'S FOSSIL/HYDRO/SOLAR GENERATION PORTFOLIO.**

A. The Company's fossil/hydro/solar generation portfolio consists of approximately 14,785 megawatts ("MWs") of generating capacity, made up as follows:

Coal-fired -	6,506 MWs
Steam Natural Gas -	170 MWs
Hydro -	3,277 MWs
Combustion Turbines -	2,633 MWs
Combined Cycle -	2,116 MWs
Solar -	71 MWs
Combined Heat and Power ("CHP") -	13 MWs

Allen, Belews Creek, Cliffside, and Marshall generating stations make up the Company's coal-fired generation assets, which total 12 units. These units are equipped with emissions control equipment, including selective catalytic or selective non-catalytic reduction ("SCR" or "SNCR") equipment for removing nitrogen oxides ("NO<sub>x</sub>"), and flue gas desulfurization ("FGD" or "scrubber") equipment for removing sulfur dioxide ("SO<sub>2</sub>").

The steam natural gas unit – W.S. Lee Station ("Lee") Unit 3 – is considered to be a peaking unit. The Company has a total of 31 simple cycle combustion turbine ("CT") units, of which 29 are considered the larger group providing approximately 2,549 MWs of capacity. These 29 units are located at Lincoln, Mill Creek, and Rockingham Stations, and are equipped with water injection systems that reduce NO<sub>x</sub> and/or have low NO<sub>x</sub> burner equipment in use. The Lee CT facility includes two units with a total capacity of 84 MWs equipped with fast-start ability in support of DEC's Oconee Nuclear Station.

1           The 2,116 MWs, shown earlier as combined cycle (“CC”), represent the Buck CC,  
2           Dan River CC, and W.S. Lee CC facilities. These facilities are equipped with technology for  
3           emissions control including SCRs, low NO<sub>x</sub> burners, and carbon monoxide/volatile organic  
4           compounds catalysts.

          The Company’s hydro fl

1 upgraded in October 2020, increasing the unit's capacity by 80 MWs. Allen Unit 3, consisting  
2 of 258 MWs, was retired on March 31, 2021.

3 **Q. WHAT ARE DEC'S OBJECTIVES IN THE OPERATION OF ITS**  
4 **FOSSIL/HYDRO/SOLAR FACILITIES?**

5 A. The primary objective of DEC's fossil/hydro/solar generation department is to provide safe,  
6 reliable, and cost-effective electricity to DEC's customers. Operations personnel and other  
7 station employees are well-trained and execute their responsibilities to the highest standards  
8 in accordance with procedures, guidelines, and a standard operating model. Like safety,  
9 environmental compliance is a "first principle" and DEC works very hard to achieve high  
10 level results.

11 The Company complies with all applicable environmental regulations and maintains  
12 station equipment and systems in a cost-effective manner to ensure reliability for customers.

13 The Company also acts in a timely manner to implement work plans and projects that enhance  
14 the safety and performance of systems, equipment, and personnel, consistent with providing  
15 low-cost power options for DEC's customers. Equipment inspection and maintenance  
16 outages are generally scheduled during the spring and fall months when customer demand is  
17 reduced due to milder temperatures. These outages are well-planned and executed to prepare  
18 the unit for reliable operation until the next planned outage to maximize value for customers.

19 **Q. WHAT IS HEAT RATE?**

20 A. Heat rate is a measure of the amount of thermal energy needed to generate a given amount of  
electric energy and is expressed as British thermal units ("Btu") per kilowatt-hour ("kWh").

1   **Q.     WHAT WAS THE AVERAGE HEAT RATE OF DEC’S COAL UNITS DURING**  
2       **THE REVIEW PERIOD?**

3   A.     Over the review period, the average heat rate for DEC’s coal fleet was 9,683 Btu/kWh. DEC’s  
4       Rogers Energy Complex (“Cliffside”), Belews Creek Steam Station (“Belews Creek”),  
5       Marshall Steam Station (“Marshall”), and Allen Steam Station (“Allen”) coal-fired generating  
6       stations have heat rates of 9,381 Btu/kWh, 9,471 Btu/kWh, 9,947 Btu/kWh, and 12,361  
7       Btu/kWh, respectively. For the review period, the Belews Creek units provided 39 percent of  
8       coal-fired generation for DEC, with the Marshall units providing 34 percent, Cliffside units  
9       providing 25 percent, and Allen units providing 3 percent.

10   **Q.     HOW MUCH GENERATION DID EACH TYPE OF FOSSIL/HYDRO/SOLAR**  
11       **GENERATING FACILITY PROVIDE FOR THE REVIEW PERIOD, AND HOW**  
12       **DOES DEC UTILIZE EACH TYPE OF GENERATING FACILITY TO SERVE**  
13       **CUSTOMERS?**

14   A.     The Company’s system generation totaled 98,267,852 MW hours (“MWhs”) for the review  
15       period. The fossil/hydro/solar fleet provided 37,285,754 MWhs, or approximately 38 percent  
16       of the total generation. The breakdown includes a 21 percent contribution from the coal-fired  
17       stations, approximately 14 percent from CC operations, 1 percent contribution from the CTs,  
18       2 percent from the hydro facilities, and 0.2 percent from the solar facilities.

The Company’s

1 characteristics of each unit generally determine the type of customer load situation (e.g., base  
2 and peak load requirements) that a unit would be called upon, or dispatched, to support.  
3 Additionally, the dual fuel optionality technology at Cliffside, Belews Creek and Marshall has  
4 aided the Company's ability to dispatch lower cost resources.

5 **Q. HOW DID DEC COST EFFECTIVELY DISPATCH THE DIVERSE MIX OF**  
6 **GENERATING UNITS DURING THE REVIEW PERIOD?**

7 A. The Company, like other utilities across the U.S., has experienced a change in the dispatch  
8 order for each type of generating facility due to favorable economics resulting from the low  
9 pricing of natural gas. Further, the addition of new CC units within the Carolinas' portfolio  
10 in recent years has provided DEC with additional natural gas resources that feature state-of-  
11 the-art technology for increased efficiency and significantly reduced emissions. These factors  
12 promote the use of natural gas and provide real benefits in cost of fuel and reduced emissions  
13 for customers.

14 **Q. PLEASE DISCUSS THE OPERATIONAL RESULTS FOR DEC'S**  
15 **FOSSIL/HYDRO/SOLAR FLEET DURING THE REVIEW PERIOD.**

16 A. The Company's generating units operated efficiently and reliably during the review period.  
17 Several key measures are used to evaluate the operational performance depending on the  
18 generator type: (1) equivalent availability factor ("EAF"), which refers to the percent of a  
19 given time period a facility was available to operate at full power, if needed (EAF is not  
20 affected by the manner in which the unit is dispatched or by the system demands; it is  
21 impacted, however, by planned and unplanned (*i.e.*, forced) outage time); (2) net capacity  
factor ("NCF")

its maximum dependable capacity (NCF is affected by the dispatch of the unit to serve customer needs); (3) equivalent forced outage rate (“EFOR”), which represents the percentage of unit failure (unplanned outage hours and equivalent unplanned derated<sup>1</sup> hours; a low EFOR represents fewer unplanned outage and derated hours, which equates to a higher reliability measure); and, (4) starting reliability (“SR”), which represents the percentage of successful starts. For 2021, the Company is including another measure to assess plant reliability—equivalent forced outage factor (“EFOF”)—which quantifies the number of period hours in a year during which the unit is unavailable because of forced outages and forced deratings.

The following chart provides operational results categorized by generator type, as well as results from the most recently published North American Electric Reliability Council (“NERC”) Generating Unit Statistical Brochure representing the period 2015 through 2019. The NERC data reported for the coal-fired units represents an average of comparable units based on capacity rating. The data in the chart reflects DEC results compared to NERC five-year comparisons.

Generator Type	Measure	Review Period	2015 - 2019	Nbr of Units
		DEC Operational	NERC Average	
Coal-Fired Test Period	EAF	66.9%	76.4%	705
	EFOR	14.7%	9.5%	
	EFOF	8.4%	n/a	
Coal-Fired Summer Peak	EAF	78.7%	n/a	n/a
Total CC Average	EAF	82.0%	84.9%	350
	NCF	69.1%	54.8%	
	EFOR	0.22%	4.9%	
	EFOF	0.19%	n/a	
Total CT Average	EAF	84.2%	86.9%	746
	SR	99.4%	98.4%	
Hydro	EAF	72.7%	79.9%	1,060

<sup>1</sup> Derated hours are hours the unit operation was less than full capacity.

1   **Q.   PLEASE DISCUSS SIGNIFICANT OUTAGES OCCURRING AT DEC’S**  
2   **FOSSIL/HYDRO/SOLAR FACILITIES DURING THE REVIEW PERIOD.**

3   A.   In general, planned maintenance outages for all fossil and larger hydro units are scheduled for  
4       the spring and fall to maximize unit availability during periods of peak demand. Most of these  
5       units had at least one small planned outage during this review period to inspect and maintain  
6       plant equipment.

7           Cliffside Unit 6 performed a boiler outage in the fall 2020. The primary purpose of  
8       the outage was to perform Mercury and Air Toxics Standards (“MATS”) boiler repairs,  
9       turbine valve inspections and repairs, and recirculating pump replacement. Allen Units 1, 2,  
10      and 5 performed a 2020 fall outage to make repairs to the absorbers. Belews Creek Unit 2  
11      performed a 2020 fall outage to complete the boiler natural gas cofire conversion and  
12      complete HP turbine generator valve work. Belews Creek Unit 1 performed a 2020 fall outage  
13      to replace combustion air header, clean primary air heaters, and to overlap the Belews Creek  
14      Unit 2’s outage to perform auxiliary boiler gas conversion. Marshall Unit 3 had a fall outage  
      to install the remaining gas piping for the Dual Fuel Operations (“DFO”) project, install flame

1 an FGD booster fan, burner replacements, turbine bearing inspections, and other balance of  
2 plant maintenance.

3 **Q. HOW DOES DEC ENSURE EMISSIONS REDUCTIONS FOR ENVIRONMENTAL**  
4 **COMPLIANCE?**

5 A. The Company has installed pollution control equipment to meet various current federal, state,  
6 and local reduction requirements for NO<sub>x</sub> and SO<sub>2</sub> emissions. The SCR technology that DEC  
7 currently operates on the coal-fired units uses ammonia or urea for NO<sub>x</sub> removal. The SNCR  
8 technology employed at Allen station and Marshall Units 1, 2 and 4 injects urea into the boiler  
9 for NO<sub>x</sub> removal. All DEC coal units have wet scrubbers installed which use crushed  
10 limestone for SO<sub>2</sub> removal. Cliffside 6 has a state-of-the-art SO<sub>2</sub> reduction system which  
11 couples a wet scrubber (e.g., limestone) and dry scrubber (e.g., quicklime). SCR equipment  
12 is also an integral part of the design of the Buck and Dan River CC Stations in which aqueous  
13 ammonia is introduced for NO<sub>x</sub> removal.

14 Overall, the type and quantity of chemicals used to reduce emissions at the plants  
15 varies depending on the generation output of the unit, the chemical constituents in the fuel  
16 burned, and/or the level of emissions reduction required. The Company is managing the  
17 impacts, favorable or unfavorable, as a result of changes to the fuel mix and/or changes in  
18 coal burn due to competing fuels and utilization of non-traditional coals. Overall, the goal is  
19 to effectively comply with emissions regulations and provide the optimal total-cost solution  
20 for operation of the unit. The Company will continue to leverage new technologies and  
21 chemicals to meet both present and future state and federal emission requirements including  
22 the MATS rule. MATS chemicals that DEC uses when required to reduce emissions include,  
23 but may not be limited to, activated carbon, mercury oxidation chemicals, and mercury re-

1            emission prevention chemicals. Company witness Sykes provides the cost information for  
DEC's chemical use and